

Amendment under *Ex Parte Quayle* Practice
U.S. Application No. 10/517,840

AMENDMENTS TO THE SPECIFICATION

Please replace the present title with the following amended title:

PIEZOELECTRIC ELEMENT, AND LIQUID JET HEAD USING THE
PIEZOELECTRIC ELEMENT AND MANUFACTURING METHOD THEREOF

Page 1, after the title and before the first paragraph, please insert:

This is a National Stage entry Application based on PCT/JP2003/007990, filed on June 24, 2003. The entire disclosure of the prior application, application number PCT/JP2003/007990, is considered part of the disclosure of the present application and is hereby incorporated by reference.

The paragraph beginning on page 2 and ending on page 3 is amended as follows:

Further, this type of piezoelectric element is applied to a liquid jet head such as an ink-jet recording head. In the ink-jet recording head, a vibration plate constructs a part of each pressure generating chamber which communicates with a nozzle orifice for ejecting ink, and the vibration plate is deformed by the piezoelectric element to pressurize ink within the pressure generating chamber and thereby the ink droplets are ejected from the nozzle orifice. There are two types of ink-jet recording heads which are in practical use: the ink-jet recording head using a piezoelectric actuator in a longitudinal vibration mode where the actuator stretches and shrinks in an axis direction of the piezoelectric element; and the ink-jet recording head in a flexuralflexural vibration mode. The ink-jet recording head in the flexuralflexural vibration mode is typified by a known ink-jet recording head in which the piezoelectric elements are formed in the following

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manner: a uniform piezoelectric layer is formed over the entire surface of the vibration plate by a deposition technology; and the piezoelectric layer thus obtained is cut using a lithography method into pieces, each having a shape corresponding to each pressure generating chamber so that the piezoelectric elements are formed separately for the respective pressure generating chambers.

Please amend page 3, the first full paragraph, as follows:

There is an example of the ink-jet recording head having the aforementioned piezoelectric element in the ~~flexture~~flexure vibration mode, which is disclosed in Japanese Patent Laid-Open Publication No. 2000-326503. In this ink-jet recording head, a lower electrode which constitutes the piezoelectric element is patterned in a region facing the pressure generating chamber, thus suppressing initial ~~flexture~~flexure of the vibration plate and increasing an amount of displacement of the vibration plate due to drive of the piezoelectric element.

Please amend page 7, the second full paragraph, as follows:

The fifth aspect of the present invention is a manufacturing method of a piezoelectric element according to the fourth aspect of the present invention, in which each of the first and second piezoelectric layers are formed by applying a sol containing the organometallic compound once, followed by ~~galation~~gelation and crystallizing the sol, and the rest of the piezoelectric layers are formed by applying the sol containing the organometallic compound twice or more, followed by gelation and crystallization of the sol.

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Please amend page 20, the first full paragraph, as follows:

The foregoing ink-jet recording head in this embodiment takes in ink from unillustrated external ink supply means and the inside of the recording head, from the reservoir 100 through the nozzle orifices 21, is filled with the ink. Thereafter, in accordance with a recording signal from an unillustrated drive circuit, a voltage is applied through external wiring between the lower and upper electrode films 60 and 80, respectively corresponding to the pressure-generating chambers 12. The elastic film 50, the insulation film 55, the lower electrode film 60 and the piezoelectric layer 70 are then flexurally deformed. Thus, pressure in each of the pressure-generating chambers 12 is increased and ink droplets are ejected from the nozzle orifices 21.